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EM-453 (A Rampertaap, 3-8191)

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SUBJECT

Comments on Rocky Flats Draft Final Treatability Study Work Plan for Oxidation/Reduction

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Frazer Loc'hart, Rocky Flats Office

The Office Southwestern Area Programs, Rocky Flats/Albuquerque Production Division (EM-453), has reviewed the above-referenced document and is providing the attached comments. Please address these comments before the document is finalized.

Call me at FTS 233-8191 if you have any questions related to this request.

Hutar Kampertag

Rocky Flats/Albuquerque Production Division

Office of Southwestern Area Programs

Environmental Restoration

Attachment

cc w/o attachment: R. Greenberg, EM-453

cc w/attachment.
B Magee, HAZWRAP

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EM-453 COMMENTS ON ROCKY FLATS DRAFT FINAL TREATABILITY STUDY WORK PLAN FOR OXIDATION/REDUCTION

GENERAL COMMENTS:

- It is our understanding that a water treatment plant currently exists for purification of the "contaminated" water from the "french drain" at 881 Hillside, operable unit (OU)1 A major concern at the 881 Hillside was a "plume of dissolved solids" with concentrations exceeding 500 parts per million (ppm) (Safe Drinking Water Act (SDWA), the proposed Applicable or Relevant and Appropriate Requirement (ARAR). If the treatment plant for the 881 Hillside "french drain" is capable of deionizing water, then it would appear that this study has no purpose, please clarify the nature of the present water treatment system. Finally, the process of deionizing water with organic resins is not a novel technology; therefore, the purpose of this study is unclear
- Please compare the concentrations of inorganic species to background concentrations. Naturally occurring and common metals species including iron, manganese, and aluminum are targeted as "contaminants" that exceed proposed ARARs (e g, Table A-2, page A-5). These inorganic species should not be compared to regulatory established ARARs, but rather natural background concentrations by an amount that is statistically significant. (As noted in specific comment 15, the simple statistical analysis presented in Table A-2 is insufficient to establish background.)
- Please include a list of mass-balance equations that describe the general outcome of each of the techniques. The work plan presents several different procedures for oxidizing and reducing groundwater and surface water in an attempt to precipitate metal species, including radionuclides. Although the benchscale procedures are presented to a sufficient degree of detail, the chemical theory behind the procedures is totally lacking. For each procedure the investigator need to express the reactions that they hope to utilize in the oxidation/reduction, precipitation process. We realize that natural aqueous systems are complex and that it is nearly impossible to write all the possible linearly independent reactions that are anticipated in the benchscale experiments, however, there should be some attempt to describe the outcome of the experiments before they are performed
- All samples should be filtered prior to analysis. The concern is that chemical analysis conducted on the pre-treated samples will be performed on unfiltered samples. This study should focus on the composition of the water as a homogeneous phase, and should not include analyses of water that contains suspended particles of clay minerals. (From a toxicological point of view, very little of the elemental constituents comprising the clay particulates are available for uptake in the biological receptor.)

It is inconsistent to analyze filtered water samples after the oxidation/reduction process has been performed on the water samples.

Those analyses that were performed on unfiltered water should be rejected. There is a concern that natural water analyses that appear to contain concentrations of inorganic species that exceed

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ARARs are merely the result of analyzing unfiltered water samples. For example, surface water samples from Station 103 (Table A-2, p 5) have reported concentrations of aluminum (Al) that are ridiculously high; i.e., 30 ppm. The range of Al concentrations in natural water (dictated by low solubility) is between (0 005 to 1 ppm). The solubility of Al is so low that there is presently little reliable experimental data on the solubility of Al and hydrated Al species in aqueous systems. These observations indicate that improper data is being utilized (e.g., analyses of unfiltered water). Please clarify and discuss this issue in Appendix A. We suspect that if only filtered water samples are analyzed, then the metals contamination problem will not be as complex as presented in this report.

- The screening process for identifying potential treatment technologies is mentioned in Section 4, however, there is no mention of the reason that the oxidation/reduction treatment option was chosen. Present a table in the Introduction that lists the analyzed treatment technologies and list the advantages and disadvantages with each technology. This is particularly important since there are commercially available technologies for deionizing and purifying water that are proven to be effective
- The protocols should include some contingency plans for investigation of alternate treatment process paths Considerable freedom to deviate from set experimental tasks is an important component in any testing program. The treatment protocol seems to be comprehensive
- Metal species (e g, AL, iron, manganese, cadmium, etc) referred to in the text as contaminants (e g, p ES-2, para 3) should simply be referred to as inorganic species. It has not been established that these constituents are contaminants. No comparisons with geochemical background are presented. Please drop the word contaminants.
- In the sampling and Analysis Plan (Appendix A) need subject for this sentence does not contain a discussion of the analytical routine or justification. The only discussion concerning the analytical routine is found under the heading A 4 2 Sample Containers and Preservatives. Table A-9 (p. 22) presents container needs, preservation and holding times for target compounds, and target analytes. Table A 10 (p. 23) presents a list of analytical methods and detection limits. These are generic lists. Some specification to the particular study is needed to justify the inclusion of an analysis plan. What is the value of a plan that does not discuss the analysis.

Table A 9 lists Contract Laboratory Program (CLP) metals (TAL), Table A 10 lists SW 846 analytical methods. CLP and SW-846 methods differ and should not be considered necessarily the equivalent

SPECIFIC COMMENTS:

- Section 10, p 1, paragraph (par) 1. The scope of the document and of the testing need to be clearly and consistently stated. The statement is made that the purpose of the Treatability Studies (TS) Plan was to present technologies that would be applicable at two or more operable units. The next sentence states that the treatability studies are designed to provide information to the individual OUs. These statements are not contradictory, but they do raise a question about the scope of the effort. If the TS is to be OU-specific, then this would expand the scope to looking at individual site problems. If the plan only looked at problems across the site, then potential technologies may be ignored.
- Section 2.3, p. 7, par 2. Inorganic species which exist in the water samples should not be targeted for study unless it is proven that they are contaminates. It is noted that "arsenic, cadmium, chromium, iron, lead, manganese, and selenium have been detected in two or more OUs." These are naturally occurring inorganic species that can be detected in most natural waters. Unless these species were detected at concentrations exceeding natural background, drop them from further consideration.
- Table 2-2, p 14 A table should be provided that described the OUs, and a figure showing the geographic location
 - Please clarify with a more comprehensive table that cross references sampling locations, OUs, and contaminants of concern This table does not match Tables A-2 or A-5 with regards to OUs or contaminants of concern
- 4 Section 5 2, p 2, bullet 3 Please define "commercial scale"
- Figure 5-2, p 4 Please clarify the use of "priorities" and "other precipitation" Neither of these in the context of the figure or text are clear
- Section 5 3, p 9, bullet 3 This procedure should be clarified Given the small amounts of dissolved material in these samples, observing inches (or centimeters) of advancing liquid solid interface does not appear realistic. It is doubtful that a distinct interface between the liquid and solids can be observed. Please clarify the reference to a liquid/solid interface.
- 7 Section 5 2, "Task 2," p 10, bullet 1 Provide a description on how the pH will be adjusted
- 8 Section 5 2, "Task 2," built 3 Should be the "reaction" described with a mass-balance equation(s)
- 9 Section 5 2, "Task 2," par 10, bullet 6 Please clarify this reference Most of the parameters listed are already included in the analysis
- Section 5 2, "Task 6," bullet 1 If possible, further define the different anionic polymers to be tested

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- 11 Table 6-1, p 2 The footnote is inappropriate in this document and should be deleted
- Section 8 1, p. 2 Floc size does not appear to be a "judgement" call Size is a measurable parameter
- 13 Section A 1 1, p 2, par. 3 How average and above-average were determined should be described
- 14 Table A-1, 1-3. How these chemicals of concern were chosen should be described
- Table A-2, p 5 Please include a discussion of when these analyses were conducted and the trend over time at these locations. The values reported for station 103, for Al and iron appear unreasonably high, i.e., thermodynamically impossible to have concentration of this dissolved species in groundwater.

The statistical analysis presented in this table should be corrected. The geometric mean is taken of the concentrations of "metals of concern" from seven locations. Concentrations of species that exceed the mean by one standard deviation are then highlighted. Comparing the geometric mean with an individual that is a component of the population from which the mean was derived has absolutely no meaning. The mean and the distribution around a mean are tools for comparing separate populations. These are not tools for comparing the population from which the mean itself was derived. This table and Table A-3 (p. 5) should present the mean, range, and two standard deviations about the mean of the background concentrations (or in the case of Table A-3 the background activity) of the inorganic species. These should be the standard for comparisons, not the mean of the population shown in Table A-2 (or Table A-3) or the ARARs established by the SDWA

Section A 1 2, p 13, par 1 Only filtered water samples should be analyzed. The taking of unfiltered samples for analyses does not appear correct. The objective of this treatability study is to examine the removal of dissolved chemical species from water. By analyzing unfiltered samples, both dissolved and suspended solids are analyzed. It is appropriate to study only filtered samples.

This is also the only reference to chemically analyzing samples prior to the treatability study. This appears to be an important step in the process and should be included in the main report

- 17 Section A 4 2, p 21, par 2. This paragraph references Table A-9 and A-10. This is the only reference to the analytical parameters in this report. This information should be expanded and moved to a separate section. A discussion of the analytical methods is a necessary component of a Sampling and Analysis Plan, information which is lacking in this report.
- Table A-9 and Table A-10, p 22 and 23 These two tables do not match Table A-9 shows chromium, hexavalent, while Table A-10 only shows total chromium Footnote B, Table A-9, lists more specific radiological tests than those shown on Table A-10 Please provide a specific analytical table for this effort with sufficient description and referencing in the text.

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- Table A-9, p 22 The text referenced this table as designating CLP and non-CLP parameters of interest. This table does not appear to differentiate between CLP and non-CLP parameters, other than listing metals as TAL. Those parameters that will be analyzed by CLP procedures should be specifically identified. The document does not present a clear discussion of the level of analytical quality required for this study. General statements made in section 4.2.3 and in the appendix C-Quality Assurance Addendum suggest that all analytical parameters will be CLP.
 - Footnote B synclear _This footnote states that specific analyses will be "defined as some or all of the following". The text does not address how the decision on which parameters to analyze for will be made ______ This should be specifically stated in the report
- Table A-10, p 23 Some of the procedures listed are not CLP Please clarify the level of data quality in this report and present it consistently throughout.
- Appendix B This should be a specific plan for this effort. It is unclear as to why this is a "Sample Health and Safety Plan" All of the "contaminants" and sample locations have been defined